Anacostia Water-Quality Monitoring Program
Semi-annual Progress Report
U.S. Geological Survey

Reporting Period July 1 through December 31, 2004

Cooperating Agencies Maryland Department of the Environment (MDE)
Prince Georges County (PGC)
U.S. Geological Survey (USGS)
U.S. Environmental Protection Agency (USEPA)

Project Personnel

Brenda Feit Majedi, Project Chief
Dave Brower, Hydrologic Technician

Project Objectives:

1. Install housing and equipment for water-quality sample collection at two Anacostia River USGS stream gage sites in Prince Georges County (01649500, Northeast Branch (NE Br) Anacostia River at Riverdale, MD; 01651000 Northwest Branch (NW Br) Anacostia near Hyattsville, MD).
2. Install equipment to provide real-time reporting of additional water-quality parameters (water temperature, pH, specific conductance, turbidity, and dissolved oxygen); develop regression relations to estimate continuous nitrate (NO_3), total nitrogen, total phosphorus, bacteria (*E. coli*), and suspended-sediment concentrations.
3. Collect and analyze monthly and stormflow samples at the two sites for a suite of constituents, which includes nutrients (nitrogen and phosphorus), trace metals, organics (PCB's, PAH's, and organochlorine insecticides), bacteria (*E. coli* and enterococci), BOD, TOC, suspended sediment, and TSS.
4. Plan, coordinate, and oversee sample collection at both sites, including the quality-assurance data-collection effort.
5. Manage all data collected for the project and publish annually in the MD-DE-DC District annual data report. Organics data will be forwarded to USGS by GMU; USGS will then forward to PGC and MDE.

Deliverables:

1. Water-quality data, to be published in the USGS water year 2004 annual data report.
2. Continuous data collection and real-time presentation of water-quality data for water temperature, pH, specific conductance, and turbidity.
3. Two semi-annual progress reports per calendar year to the project funding partners for the reporting periods January to June and July to December of each calendar year.

Summary of project status as of December 31, 2004

Water-quality sampling program:

- The USGS continues to collect and analyze monthly and stormflow samples at each site. Samples are analyzed for nutrients, trace metals, suspended sediment, *E. coli* and enterococci, TSS, TOC, and BOD. Samples are collected over a range of hydrologic conditions and seasons.
- During water-year 2004 (October 2003 through September 30, 2004), the USGS collected a total of 64 water-quality samples at the Northeast Branch and 51 at the Northwest Branch. This number includes samples collected for quality-control purposes.
- During the current reporting period July through December 2004, the USGS collected a total of 21 samples at the Northeast Branch, and 25 at the Northwest Branch. This number reflects monthly (five at each site), storm (11 at NE Br and 15 at NW Br), and quality-control samples (several blanks and replicates at each site) collected. Note that for the August 2004 monthly sample, only bacteria analysis was performed due to budgetary constraints. Storm samples were collected in July and late September. Organics sample collection is performed by George Mason University.
- The total number of samples collected by the USGS during the first 18 months of the project (July 2003 through December 31, 2004) is listed below. This number reflects monthly, storm, and quality-control samples collected. The full suite of analyses may not be performed on all quality-control samples.

	Monthly	Stormflow	Total with QC
Northeast Branch:	17	31	67
Northwest Branch:	17	28	63

- The following summary lists the constituent and approximate length of the data record at the completion of the project's data-collection phase:

Constituent	Begin Date	Approximate Length of Data Record
Nutrients and suspended sediment	July 2003	3 full years
TSS, BOD, TOC	Sept. 2003	Nearly 3 full years
Trace metals and bacteria	Oct. 2003	2.75 years
Organics (GMU)	April 2004	2 years, assuming continuous data collection April 2004 through April 2006
Continuous T, SC, pH, turbidity	Dec'03/Feb'04	2+ years, depending on site

- Changes to the USGS water-quality sampling effort beginning October 2004 are listed below.
    - Mercury sample collection was suspended as of October 2004.
    - *E. coli* and enterococci analysis by the USGS Ohio Microbiology Laboratory was suspended as of October 2004; samples did not meet compliance regulations (holding time issue). Beginning October, these analyses will only be performed by the DHMH.

Summary of project status as of December 31, 2004

Water-quality sampling program:

- Sample frequency of various constituents was modified to meet budget and sample-collection limitations. The modified sample frequency (approximate) is listed in the table below. These numbers reflect quality-control samples as well.

Constituent	Lab	Approximate Number of Samples per Site per Year
Nutrients (N, P)	NWQL	40-50
BOD	DHMH	12-18
TSS	NWQL	20
SSC	Kentucky	40-50
SSC-Sand-Fine Break	Kentucky	20
LOI	Kentucky	20
Metals (Total Recoverable & Dissolved)	NWQL	40-50
TOC	NWQL	12-18
E. Coli / enterococci	DHMH	12-18
Organics (PCBs, PAHs, pesticides; dissolved and particulate phases)	GMU	25

- Cross-section variability measurements for water temperature, pH, specific conductance, dissolved oxygen, and turbidity, are made during each monthly sampling trip.
- Beginning December 2004, samples were collected for nutrient analysis by the alkaline persulfate method for the following nutrients: total nitrogen, unfiltered; total nitrogen, filtered; total dissolved phosphorus; and total phosphorus. These samples will be compared to the Kjeldahl nutrient-analysis method. These comparison samples are being collected in the event that the NWQL discontinues the Kjeldahl method.
- Beginning September 2004, a few samples will be collected at each site for total zinc concentration, which will be compared to total-recoverable zinc concentration. The concern is that we may be missing some zinc with the extraction method used for total-recoverable zinc; HF is not used for total-recoverable zinc, but is used for total zinc. Total zinc will be analyzed gratis by the USGS laboratory in Reston, Virginia. An article appeared in Environmental Science and Technology (ES&T, Vol. 38, No. 15) about zinc from tire wear in urban watersheds being significantly higher than atmospheric inputs.
- Organics sample collection and analysis by GMU is on going. About 60 samples have been collected from April to December 2004; this includes a few base-flow, several stormflow, and quality-control samples. A progress report by GMU will be forwarded upon receipt to the funding partners under separate cover.
- Organics data: Brenda sends preliminary data from GMU directly to the funding partners immediately upon receipt (via email). Preliminary PCB data for NE Branch was received November 2004 and sent to the funding partners.

Site installation, continuous data collection, real-time presentation:

- The *permanent* installation at NW Branch was completed in December. This included anchoring the in-stream instrumentation to a custom fabricated steel pier at the river's edge, and trenching and burying the conduit that encases the sampler intake lines and instrumentation cables. Cables still need to be put through new conduit, and the intakes and sonde mounted in the permanent location in the stream; this needs to wait until spring.
- NE Branch: Water-quality data for water temperature, pH, specific conductance, turbidity, and dissolved oxygen continue to be collected continuously every 15 minutes and, with the exception of dissolved oxygen, are presented on the real-time page. Gage height and discharge are also presented on the real-time page.
- NW Branch: Installed wireless telephone technology at NW Branch during this reporting period, thus enabling real-time data transmission for this site. Real-time presentation of water temperature, pH, specific conductance, turbidity, and dissolved oxygen was up and running in mid-November. Publicly available, with the exception of dissolved oxygen, on 30 November 2004; cooperators notified. Prior to this, these data were recorded every 15 minutes and archived in the data base.

Funding/Agreements:

- MDE FY05: These funds are included in the original agreement ($369,000); hence, no action necessary. The issue with '04 payment and distributed direct not itemized in original proposal budget has been resolved; Denett provide distributed direct numbers to MDE.
- MDE FY06: Funding request of $129,000 (5% increase) for additional year of monitoring was completed. Separate proposal/scope for these funds was needed, which was completed in early December. Note that these funds are coming out of MDE '05 funds; hence JFA duration is March 2005 to June 2006. JFA sent to USGS lawyers, headquarters for signature (excellent turn-around given holidays).
- EPA FY04: Funding came through in September 2004.
- EPA FY05: Proposal and budget submitted late December 2004.
- PGC FY06: Will get started on this in April 2005. Note: Dr. Cheng requested an additional $30K to cover organics in case EPA funding was not at the requested level.
- GMU Organics: Proposal, statement of work, and contract for October 2004 to March 31, 2005 was completed in the fall 2004.

Miscellaneous:

- A meeting was held in July, with a follow-up meeting in September, with the project funding partners and Greg Foster, George Mason University, regarding the organics portion of the project. Items discussed included a revised timeline for GMU organics sample collection, analysis, and data submission; deliverables; and additional funding and personnel requirements beyond September 30, 2004. Summaries of both meetings were sent to everyone present.

Miscellaneous:

- The project web page was revised to include time-series plots through December 2004, which show provisional constituent concentrations with discharge and rainfall. Graphs of nutrients (TP, TN), suspended sediment, selected trace metals (As, Cd, Cr, Cu, Hg, Pb, Ni, Zn), and bacteria (*E. coli* and enterococci) are displayed. These plots can be viewed at the following web site:
  http://md.water.usgs.gov/watershed/9B209/data.html

Plans for January through June 2005

- Continue to collect monthly and stormflow water-quality samples. Organics samples will be collected by George Mason University, and concurrently with USGS samples.
- USGS will look into connecting together their Isco sampler with GMU's Isco sampler so that they both trigger at the same time.
- Progress report from GMU re organics data collection and analysis to be received from GMU; will be forwarded to project funding partners upon receipt.
- Final organics data from the first year of the study to be received from GMU; will be forwarded to project funding partners upon receipt.
- Meet with project funding partners in February.
- Display dissolved-oxygen data on the real-time page.
- Determine EPA water year 2005 funding.
- Need proposal, statement of work, and contract for year two of organics sample collection and analysis.
- Complete PGC 2006 agreement.
- Finalize water-year 2004 water-quality data and continuous data and publish in USGS water year 2004 annual data report.
- Send finalized water year 2004 data to funding partners.
- Data analysis.